Molecular weight dependence of exciton diffusion in poly(3-hexylthiophene) - DTU Orbit (12/08/2016)

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A joint experimental and theoretical study of singlet exciton diffusion in spin-coated poly(3-hexylthiophene) (P3HT) films and its dependence on molecular weight is presented. The results show that exciton diffusion is fast along the co-facial π–π aggregates of polymer chromophores and about 100 times slower in the lateral direction between aggregates. Exciton hopping between aggregates is found to show a subtle dependence on interchain coupling, aggregate size, and Boltzmann statistics. Additionally, a clear correlation is observed between the effective exciton diffusion coefficient, the degree of aggregation of chromophores, and exciton delocalization along the polymer chain, which suggests that exciton diffusion length can be enhanced by tailored synthesis and processing conditions.

General information

State: Published
Organisations: Department of Physics, University of St Andrews, University of Mons, University of Copenhagen
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Keywords: (Exciton diffusion, Exciton-exciton annihilation, Poly(3-hexylthiophene), Molecular weight)
Pages: 1445-1453
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information

Journal: Advanced Energy Materials
Volume: 3
Issue number: 11
ISSN (Print): 1614-6832
Ratings:

BFI (2015): BFI-level 1

BFI (2014): BFI-level 1

BFI (2013): BFI-level 1

ISI indexed (2013): ISI indexed yes

ISI indexed (2012): ISI indexed no

ISI indexed (2011): ISI indexed no
Original language: English
DOIs:

10.1002/aenm.201300210
Publication: Research - peer-review › Journal article – Annual report year: 2014